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## CLAIMS

(76)

~~1. A substrate used for opto-electric or electrical~~

devices which comprises a layer of nitride grown by means  
of vapor phase epitaxy growth wherein both main surfaces of

5 the nitride substrate are substantially consisting of non  
N-polar face and N-polar face respectively and the

dislocation density of the substrate is  $5 \times 10^5/\text{cm}^2$  or less,  
wherein the substrate has a thickness of 100  $\mu\text{m}$  or more

preferably 150  $\mu\text{m}$  or more which is sliced from a portion of

10 the layer B1 and/or B2) in the combination layers of A) the

layer of bulk mono-crystal nitride containing at least one

element of alkali metals (Group I, IUPAC 1989), B1) the

layer of nitride grown by means of MOCVD or MBE and/or B2)

the layer of gallium-containing nitride grown by means of

15 HVPE.

2. A substrate used for opto-electric or electrical  
devices which comprises a layer of nitride grown by means

of vapor phase epitaxy growth wherein both main surfaces of  
the nitride substrate are substantially consisting of non

20 N-polar face and N-polar face respectively and the

dislocation density of the substrate is  $5 \times 10^5/\text{cm}^2$  or less,

wherein the substrate has a thickness of 100  $\mu\text{m}$  or more,

preferably 150  $\mu\text{m}$  or more which is sliced from a portion of

the layer C1) and/or C2) in the combination layers of A1)

25 the layer of bulk mono-crystal nitride containing at least

one element of alkali metals (Group I, IUPAC 1989), B) the  
~~layer of nitride grown by vapor phase epitaxy growth, A2)~~

the layer of bulk mono-crystal nitride containing at least  
one element of alkali metals (Group I, IUPAC 1989), C1) the  
5 layer grown by means of MOCVD or MBE and/or C2) the layer  
of gallium-containing nitride grown by means of HVPE.

3. A process of preparing a substrate for opto-electric  
or electrical devices which comprises steps of:

(a) preparing a layer A) of bulk mono-crystal nitride  
10 containing at least one element of alkali metals (Group I,  
IUPAC 1989) to have a thickness for substrate by  
crystallization of gallium or aluminum-containing nitride  
on a seed from a super-critical ammonia-containing  
solution; (b) forming a layer B) or C) of nitride by means  
15 of vapor phase epitaxy growth on Al or Ga-polar face of the  
layer A);

and (c) slicing the layer B) or C) off from the substrate  
A) to get a substrate having a thickness of 100  $\mu\text{m}$  or more  
and a main surface substantially consisting of Al or Ga-  
20 polar face.

4. A process of preparing a substrate for opto-electric  
or electrical devices, wherein the step (b) comprises (b1)  
forming a layer B1) or C1) of nitride by means of vapor  
phase epitaxy growth on Al or Ga-polar face of the layer A)

25 and (b2) forming a layer B2) or C2) of nitride by means of

vapor phase epitaxy growth on the layer B1) or C1);

~~and (c) slicing the layer B2) or C2) off from the substrate~~

A) to get a substrate having a thickness of 100  $\mu\text{m}$  or more and a main surface substantially consisting of Al or Ga-polar face.

5     5.    A process of preparing a substrate for opto-electric or electrical devices, which further comprises (d) forming a layer D) of nitride by means of vapor phase epitaxy growth on Al or Ga-polar face of the layer B), C), B2) or  
10   C2).

6.    A process of preparing a substrate for opto-electric or electrical devices, which further comprises (d) forming a layer D) of nitride by means of vapor phase epitaxy growth on Al or Ga-polar face of the layer B), C), B2) or  
15   C2);

and (e) slicing the layer D) off from the substrate B), C), B2) or C2) to get a substrate having a thickness of 100  $\mu\text{m}$  or more and a main surface substantially consisting of Al or Ga-polar face.

20   7.    A process of preparing a substrate for opto-electric or electrical devices, according to any one of claims 3 to 6, wherein the layer B), B1), C) or C1) is prepared by MOCVD and has a thickness of 0.1 to 3  $\mu\text{m}$ .

8.    A process of preparing a substrate for opto-electric  
25   or electrical devices according to claim 7, which comprises

further step of polishing one of the faces of the layer B),

~~B2), C) or C2) to get a substrate for vapor phase epitaxy.~~

9. A process of preparing a substrate for opto-electric or electrical devices according to any one of claims 3 to 8, which comprises further step of annealing the substrate B), B2), C) or C2) in the atmosphere that does not contain hydrogen at temperature between approx. 600 and 1050°C, thus producing material with better crystalline quality than before the annealing.

10. A process of preparing a substrate for opto-electric or electrical devices according to any one of claim 9, wherein the step of annealing is carried out in the atmosphere of inert gas with an addition of oxygen between 10 and 30 vol. %.

11. A process of preparing a substrate for opto-electric or electrical devices according to claim 9, wherein the the step of annealing is carried out in a single step or in multiple steps until the desired level of impurities (such as hydrogen and/or ammonia or ions formed from the impurities formed during the crystallization and/or annealing process) is reached.

12. A process of preparing a substrate for opto-electric or electrical devices according to any one of claims 3 to 11, which comprises further step of removing impurities from bulk mono-crystalline nitride by a process of rinsing

in the environment of supercritical ammonia-containing  
~~solvent, water or carbon dioxide or being subjected to the~~  
action of gaseous hydrogen, nitrogen or ammonia.

13. A process of preparing a substrate for opto-electric  
5 or electrical devices according to claim 12, wherein the  
step of rinsing is carried out with aid of the application  
of ultrasounds or the exposure to an electron beam.